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development of nautical astronomy, which science has scarcely made any progress, beyond improvements in the chronometer and compass observations, during the course of the present century, whilst the extraordinary increase in navigation evidently demands more exact determinations of a ship's place at sea than the methods previously in use. With this object in view, in 1893 Döllen published an appeal for assistance in his endeavour, and only a few weeks before his death he published a pamphlet under the title "Zur Reform der Nautischen Astronomie, Tabulæ Dorpatenses," with convenient formulæ based on Sumner's method, and gave the requisite tables calculated for a determinate latitude (58°–59°).

In the foregoing notice only the most important of Döllen's publications have been mentioned. He displayed his greatest activity indirectly as a teacher and a critic of the work of others. During his forty-five years of official life at Pulkowa almost all the work of the Observatory was influenced by his spirit and his extensive knowledge. He was the general arbiter in scientific questions. In such ways as these he essentially contributed to the prosperity of the Pulkowa Observatory under the directorship of the two Struves.

Döllen in 1848 married Charlotte, the eldest daughter of W. Struve, and spent with her forty-six years of happy married life until the time of her death in 1894.

After his retirement from official work, in 1890, it became clear that there was not only lung-trouble but weakness and ossification of the heart, which eventually brought on his death, 1897 February 16.

He was elected an Associate of the Society on 1882 November 10.

Friedrich August Theodor Winnecke was born on 1835 February 5, at the village of Gross-Heere, near Hildesheim, in Hanover, where his father was pastor. A few days after his birth his mother died, and the charge of the child devolved upon his two aunts. His father, who suffered so keenly the sudden death of his wife, resigned his parsonage after a few years. At the age of five young Winnecke was established in the home of his relations at Gittelde, in the Hartz, and later on at Hoya, where he was educated at the Gymnasium till 1850, when he went to the Lyceum at Hanover. Leaving that school when he was eighteen, he entered the University of Göttingen, and devoted himself to astronomical and mathematical studies. He had already shown great inclination in that direction while at school at Hanover by diligently observing the heavens with such small instruments as were available. At Göttingen, in company with Pape, he made observations of comets with a comet-seeker of 34 lines aperture, and determined their places with a ring micrometer. It is interesting to note that at Göttingen Winnecke aroused the enthusiasm for astronomy of the present Professor

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Auwers, who was then a pupil at the Gymnasium. The illustrious Gauss, who, on account of old age, had ceased delivering lectures, took great interest in the young and capable student at the University, and it was he who sent Winnecke's first communications to the *Astronomische Nachrichten.*

In the autumn of 1854 Winnecke went to the Berlin University, where in 1856 August he took his degree as Doctor of Philosophy. His dissertation, dedicated to Encke, was entitled "De stella η *Coronæ Borealis* duplici"—a work which at once showed at this early age his sound knowledge of theoretical and practical astronomy.

In this period of his academical career he displayed very great devotion to his studies, observing and computing night and day, while attending the University lectures and elaborating his dissertation, to which the volumes 38–44 of the *Ast. Nach.* bear witness; and his capacity for work is well shown by his determination of the diameter of *Mars* with the heliometer, and his double-star observations with the 9-inch refractor.

Attracted by the fame of that great master of practical astronomy, Argelander, Winnecke in 1856 November went to the Bonn Observatory, where he was most favourably received. Here he remained till 1858 May, displaying throughout that time great and versatile activity, recorded in his papers in vols. 45–48 of the *Ast. Nach.* The 6-inch heliometer had been used up to that time as a telescope with an undivided object-glass. Winnecke investigated it as Bessel had done with the Königsberg heliometer, and he made an extensive series of measures of the principal stars in the cluster *Præsepe*, and with it he also determined the parallax of the star *Ll.* 21185, and of the nebula *h.* 2241. Besides this, he was intent on observing comets, and it was at Bonn that he discovered a periodical comet. He also devoted much attention to variable stars, his interest in which had been excited by the fascinating influence of Argelander.

That period of successful labour, which in after years he looked back upon with so much satisfaction, did not last very long. Wilhelm Struve was a master in discovering men whose intellectual capacity fitted them for attacking certain problems. On his visit to Bonn in the autumn of 1857 he soon perceived the great advantage it would be to the Pulkowa Observatory to have the co-operation of Winnecke, and the invitation he made to him to come to Pulkowa, which was a great honour, was accepted by Winnecke, and accordingly in 1858 May he quitted Bonn. In a short time he advanced from the position of an assistant to that of senior astronomer, and finally to the position of Vice-Director of the observatory.

At Pulkowa his great industry in using the refined instruments of that observatory was unprecedented, and exercised an immense influence not only upon the staff but upon all astronomers who visited the observatory. The Repsold Meridian Circle engaged most of his attention, and the observations he

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made with it, extending from 1858 September to 1864 October, form a large part of the first Pulkowa General Catalogue of Stars.

In order to test the accuracy of Encke's value of the solar parallax, determined nearly forty years previously, Winnecke proposed in 1862 an elaborate programme for meridian circle observations of *Mars* at the approaching opposition, which was successfully carried out; and by combining the Cape observations with his own he arrived at a value of 8″·964 for this constant, proving that Encke's value was too small.

Winnecke's careful investigations on the nature of the great comets of 1858 and 1862 with the 7-inch heliometer and the 15-inch refractor are well known. Many observations of comets, nebulæ, and variable stars made by him in this period will be found in vols. 49–60 of the *Ast. Nach.* In 1864 he temporarily undertook the Directorship of the Pulkowa Observatory during the serious illness of the Director, Otto Struve. It was during this period also that he entered into friendly relations with many English astronomers, especially with Sir George Airy, and he was a member of the Himalaya eclipse party which went to Spain in 1860. In 1864 he paid a second visit to Greenwich for the purpose of examining the old Bradley instruments and MSS.

In 1864 May Winnecke married the niece of Otto Struve. But soon a cloud overshadowed the happiness of his married life. He began to feel the effects of an illness contracted on a voyage, and of over excitement, produced partly by the excessive mental strain of the previous ten years, partly by the weight of responsibility on one so young in the extensive administration of a large observatory, and perhaps also by an attack of acute terror experienced when working one night with the meridian circle. Finding it in vain to obtain recovery from visits to various health resorts, he, in 1865, sent in his resignation, and placed himself under the treatment of Dr. Hertz, at Bonn, where, by the year 1867, his health was completely restored. He now established himself at Carlsruhe with his wife's relations, and by degrees was able to resume some astronomical work. The Grand Duke Frederick of Baden graciously granted him the use of an observatory in the Erbprinzen Garten, and he had some rooms in the small castle, where he was able to observe with some small instruments. Later on he took part in the preparations for the transit of Venus expeditions.

Satisfied with his work, and encouraged by the prospect of renewed happiness, his health greatly improved, so much so that in 1872 he was called to Strasburg to fill a professor's chair and to establish the new observatory that was proposed to be founded there. His old activity at once returned, and he worked hard at elaborating his proposals for the erection of the observatory. He was also much occupied in training astronomers in the necessary investigation of the four heliometers which were to be employed at the forthcoming transit of Venus in 1874.

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Eminent as he was in research, he displayed now an equal mastery in the art of teaching. His excellent methodic lectures on astronomy at the university, and his instructive scientific discussions, were most inspiring, ever suggesting independent working in theoretical researches, and in the practical use of instruments. Though he was heart and soul an observer, his mathematical ability made him a master in theoretical investigation, which he enunciated clearly and tersely. His enthusiasm for astronomy, and his unrelaxing energy in utilising every available hour of the night when the sky was clear, made him a conspicuous example to inspire and imitate. With all his superiority and scientific eminence and many-sided knowledge, he was gifted with refined modesty. If asked a difficult question, he requested a short time to consider it, and to consult the literature of the subject, with which he had an extraordinary acquaintance, and then he always delivered an exhaustive explanation.

In 1880 the new observatory, furnished with the largest and best instruments, and admirably constructed in every way, was finished, and in November of that year he was installed. In this year Winnecke was invited to fill the professor's chair for astronomy and to direct the observatory at the Munich University, as successor to Lamont, but the Government induced him to decline it.

The preliminary work for the various proposed investigations at Strasburg was commenced, when in 1881 January 13 he was plunged into affliction by the death of his eldest child, a highly capable and amiable boy. It might be that the absorbing interest of completing the observatory before the meeting of the Astronomische Gesellschaft at Strasburg, which was fixed for 1881 September, and which he accomplished with so much success, kept him up, and thus delayed the sad catastrophe dreaded by his friends; nevertheless in 1882 January, just when his colleagues had elected him rector of the university, and a year after the sad death of his child, the melancholy power again took possession of him. He resolved immediately to put himself under the care of Dr. Hertz at Bonn, hoping, like his family and friends, that the sympathetic treatment of that experienced physician might be able to ward off once more his impending fate. Unhappily all treatment was unavailing, and darkness settled on his great mind uninterruptedly for sixteen years, till 1897 December 2, when he peacefully died.

By his numerous important investigations in various branches of astronomy, published in the *Astronomische Nachrichten*; in the *Monthly Notices*; in the *Vierteljahrsschrift der Astronomischen Gesellschaft*; in the *Bulletin* and *Mémoires de l'Académie de St.-Pétersbourg*; and in the Pulkowa publications; and by the erection and establishing of the Strasburg Observatory, Winnecke has founded a permanent memorial of his illustrious place as an astronomer.

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As he was many-sided in astronomy, so he was well acquainted with other branches of natural science, especially geology and mineralogy, in which he took great interest and worked at practically. His versatility and his humour made him a most genial companion. His love of truth, his loyalty, and the gentleness of his mind made him a highly esteemed and beloved friend; and his trustworthy judgment and extensive knowledge contributed to his excellence as a teacher and a scientific man.

He was elected an Associate of the Society 1863 November 13.

[The council is indebted to Dr. Ernst Hartwig for this notice.]